DEVICE FOR ORIENTING SPRINGS

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ABSTRACT

The device for aligning springs (7) on transport from a spring winding machine to a spring interior assembly automatic machine comprises at least one rotary plate (17) which is mounted on a revolving path about a rotary axle (B) and itself is likewise drivably mounted about a rotary axle (A). From the take-over location (X) the springs are individually taken over by a gripper hand of a transport star and, slightly pressed together, are inserted between the rotary plates (17). The springs (7) are aligned by way of this so that at the transfer location (Y) they have the desired rotary angle end position and may be inserted by at least one transfer finger (27) between the belt faces (13) of two transport belts (13).
DEVICE FOR ORIENTING SPRINGS

[0001] The subject-matter of the invention is a device for aligning springs according to the preamble of patent claim 1.

[0002] With the known automatic manufacture of spring interior mattresses, springs manufactured on a spring winding machine are taken off by a transport star with several arms, if desired knotted at the ends and in any case additionally subjected to a heat treatment. At the ends of the arms there are arranged gripper hands which remove the springs from the spring winding machine and hold these rigidly during transport. The springs are transferred from the transport star to a transport belt pair and are introduced into this into a spring interior assembly automatic machine, in order here finally connected to one another with spiral wires to be joined together into a spring interior of a predetermined size. The springs manufactured on the spring winding machine, without additional measures adjusting the springs, reach the transport belt and thus the spring interior assembly automatic machine aligned more or less equally, i.e. the ends of the wires in the region of the end rings lie in each case more or less at the same location. Furthermore this means that for example the last springs of a row are aligned outwardly and thus penetrate through the mattress material. In order to prevent this usually the last spring is rotated by 180° about its own axis so that the free ends or the two knots of the ends or knots of the last springs are aligned towards the second to last spring. It is however often desirable to arrange the springs in pairs with the knots or spring wire ends lying opposite one another. There are already known various devices for this purpose, i.e. the alternate alignment of the knots. From DE-A1 19542847 with a spring led from the rotary star from a spring winding device it is known within the transport belt to rotate this spring about its own axis with a suitably designed displacer, until the knots have reached the desired angular position. The displacement is effected by a displacing device which is designed in a manner such that one may only roughly achieve the alignment of the knot which is set once. Another desired alignment may only be effected by exchange of the displacer of the displacing device.

[0003] The object of the present invention then lies in providing a device for aligning springs or their end knots or generally the end regions to a predetermined angular position which may be changed at any time.

[0004] This object is achieved by a device with the features of the patent claim 1. Advantageous formations are defined in the dependent claims.

[0005] The freely selectable rotational angle end position of the rotary plate during its rotational movement from the take-over location to the transfer location permits the position of the knots and/or ends of the spring wire to be brought into each desired position on the transport belt. Any end positions as a result are possible from spring to spring. With the use of several rotary plates on a rotary disk or likewise which accommodate the rotary plates, the cadence of the aligned springs is considerably increased. Furthermore by way of the application of several rotary plates their rotational speed on alignment is reduced and thus a sliding of the springs tensioned between the rotary plate pairs on the surfaces of the rotary plates is prevented. In a preferred formation of the invention, when using several rotary plates the later are driven synchronously and without slip by a single toothed belt or chain overdrive. The drive of the toothed belt is effected from the rotational centre of the rotary disk. The latter is preferably likewise driven by a servo drive and in steps is led from the take-over position to the transfer position. The introduction of the springs from the transport star or out of their gripper hands into the rotary plate pair and out of the latter is effected in a conventional manner by the linearly driven displacers or by grippers on a pivot axis.

[0006] The invention is described in more detail by way of illustrated embodiment examples. There are shown in:

[0007] FIG. 1 a schematic representation of a rotary star and a transport belt with individual rotary plates arranged therebetween mounted on a crank arm,

[0008] FIG. 2 as FIG. 1, but a device with two rotary plates

[0009] FIG. 3 a longitudinal section through the rotary disk with three rotary plates as well as the insertion and ejection device,

[0010] FIG. 4 a plan view of the rotary disk in FIG. 3 and

[0011] FIG. 5 a view of the rotary disk with a belt drive of the rotary plates.

[0012] In FIG. 1 there is schematically shown a rotary star 1 with six gripper arms 3 and mechanically or electrically drivable gripper hands 5 at their ends. With the gripper hands 5, whose design is the state of the art, the springs 7 are gripped and held, these springs having been previously wound on a spring winding device 9. Their ends may be knotted in a knotting device. Additionally to the knotting device 11 on the transport path which the springs 7 run through in the hands 5, there may be arranged a heat treatment station (not shown). At a distance indicated at X to the take-over location at which the springs 7 are removed from the gripper hand 5 there lies a transfer location Y at which the springs 7 are transferred to a transport belt pair 13. Between the spring take-over location X and the spring transfer location Y on a rotary axle B there is fastened a crank arm 15 which may be driven by a servo-motor MB, and on whose distal end there is arranged an axially distanced rotary plate pair 17 which may be driven by a further servo-motor.

[0013] In FIG. 2 the conditions are the same as in FIG. 1, with the exception that on the rotary axle B there are rotatably fastened two crank arms 15 on whose ends there are again arranged two rotary plate pairs 17. The drives of the arm or arms 15 as well as the rotary plates 17 rotatably mounted thereon are described in more detail by way of the particularly favourable formation of the invention with three rotary plate pairs 17 represented in FIG. 5. For the purpose of increasing the cadence, i.e. the springs 7, be aligned per minute, in this formation of the invention in each case three rotary plates 17 are arranged in each rotary disk 19. The rotary disks 17 in turn are drivably mounted about the rotation centre B. The rotary plates 17 rotate in the recesses 29 envisaged for this in the rotary disks 19 about the rotary axes A. The two oppositely lying rotors 17 of the rotary disks 19 are drivably mounted on the axle B and their oppositely lying surfaces as well as the surfaces of the rotary plates 17 rotatably mounted in the rotary disks 19 lie in the common plane E. The distance e between the two planes E
formed by the rotary disks 19 and rotary plates 17 is smaller than the nominal height of a relieved spring 7. By way of pressing together the latter, at the latest, shortly before insertion of the latter at the take-over location X by the gripper hand 5 between the rotary plates 17 the spring on account of its intrinsic tension force during transport to the transfer location Y is held by way of the friction fit of the end rings with the surface of the rotary plates 17. The compression of the springs 7 at the take-over location X may for example be effected between two tapering plates 25. The removal of the springs 7 (from the gripper hand 5 and the introduction of the springs 7 between the rotary plates 17 may be effected by a displacer 21 with suitably designed displacing fingers 26. Analogously to the insertion transfer fingers 27 are formed at the transfer location Y, which are however individually driven synchronously or are held and mounted on a common plate 28 as with the displacing fingers 23.

[0014] The rotary plates 17 rotatably mounted in the tight-tolerance, circular recesses 29 in the two rotary disks 19 are in each case partly embraced by a double-sided toothed belt 31. Furthermore each of the two toothed belts 31 embraces a drive belt wheel 33 which is seated on the drive axle B of the rotary disk 19 and which may be driven by a servo-motor MA. The rotary disk 19 is likewise drivable by a servo-motor MB, and specifically independently of the drive of the rotary plates 17 (FIG. 5). The two drive shafts for the rotary disks 19 and the drive belt wheels are arranged coaxially.

[0015] In the following, the manner of functioning of the device is explained in more detail. With the rotary star 1, individual springs 7 from below (arrow P) held by the gripper hand 5 are introduced between the tensioning and introduction plate and at the same time are pressed axially together. The spring 7 with the displacer 21 or its advance fingers 23 is taken out of the gripper hand 5 not shown in FIG. 3 and is inserted between the rotary disks 19 arranged opposite one another in pairs, and subsequently the rotary plates 17 arranged therein, and thereupon positioned concentrically to the rotary axe A of the rotary plates 17. Simultaneously the removal finger 27 displaces a spring 7 located at the spring transfer location Y out of the rotary plate pair 17 which has reached this position, between the inner belt faces 13 lying opposite one another, of the transport belts 13 (right side in FIG. 3). The deflection rollers 35 of the two transport belts 13 are mounted on vertical axes C which lie slightly outside the periphery of the rotary disk 19. After transferring a spring 7 out of the gripper hand 5 into the adjacent lying rotary plate 17 and after the synchronous leading-out of an aligned spring 7 from the rotary plate 17 lying neighbouring the transport belt pair there is effected a rotation of the rotary disk 19 by 120° so that the spring 7 which have just been transferred from the gripper hand 5 to the rotary plates 5 is guided downwards and that previously located below now lies opposite the transport belts 13. Now an empty rotary plate pair 17 which has just transferred its spring to the transport belt pair 13 lies adjacent to the subsequent gripper hand 5 with a new spring 7. During the rotational movement of the rotary disk 19 twice by 120° all rotary plates 17 are synchronously guided into the desired rotary angle end position at the transfer location Y since they are connected by the toothed belt 31 and driven by the servo-motor MA. In the illustration according to FIG. 3 the adjacent flat locations 37 at the end rings of the springs 7 lie above and below, wherein alternately the narrower flat location 37 lies above and the wider lies below and vice versa. By way of a suitable activation of the drive servo-motor M_A of the rotary plates 17 the narrow flat location may also be aligned to the left or right according to the set demands within the spring interior automatic machine (not shown).

[0016] For an improved overview the knots or wire ends at the end rings of the springs have not been shown in the figures, but flat locations of differing widths and their rotational position with respect to the horizontal in the figures.

1. A device for aligning the knots or wire ends at the end rings of springs (7) with the transport of springs (7) from a spring winding machine to a spring interior assembly automatic machine with a transport star (I), whose gripper hands (5) take over the springs (7) at the winding station of the spring winding machine and with a pair of transport belts (13) for the further transport of the aligned springs (7) to the assembly automatic machine as well as with a transfer element (17, 19) for transferring the springs (7) from the transport star (I) to the transport belts (13), characterized in that the transfer element comprises at least one drivable pair of rotary plates (17) lying opposite one at a distance, whose common rotary axle (A) is revolvably mounted at a distance to a central rotary axle (B).

2. A device according to claim 1, characterized in that the rotary plate pair (17) is drivable by a servo-motor (M_A) and that a spring (7) held clamped between the rotary plate pair (17) between the take-over by the transport star (I) at the take-over location (X) up to the transport to the transport belt (13) at the transfer location (Y) may be transferred at any selectable rotary angle end position.

3. A device according to one of the claims 1 or 2, characterized in that the rotary plates (17) are synchronously rotatably mounted by at least two rotary plate pairs (17) in circular recesses (29) in two rotary disks (19) lying opposite one another, and are drivably mounted by a drive motor (MA).

4. A device according to claim 3, characterized in that the rotary plates (17) mounted in the rotary disks (19) may be driven by the servo-motor (M_A) via a common toothed belt (31) and the rotary disks (19) are drivable by a further servo-motor (M_B) independently of one another.

5. A device according to one of the claims 1 to 4, characterized in that the springs (7) are insertable by a displacing finger (23) out of the gripper hand (5) on the rotary star (I) into a rotary plate pair (17) and may be transferred by at least one transfer finger (27) out of the rotary plate pair (17) between the belt faces (13) of the two revolving transport belts (13).

6. A device according to claim 5, characterized in that the springs (7) before removal from the gripper hand (5) are axially pressed together between two revolving tensioning and introduction plates (25) by the displacing finger (23).